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conceivable that the mental contemplation of the relation of the positions of the moon and star which is implied in the phenomenon that is to be observed, may frequently so far act on the sensibilities that when that relation (namely, contact) is once gained, the mental effort does not make the sense more acute than is necessary, and may even somewhat relax as the denser light of the moon approaches the star.

"The explanation which I have offered of these curious phenomena does in reality bring them under the general category of irradiation. But it is a kind of irradiation which has not, so far as I know, been noticed in other instances, an irradiation which sometimes exists and sometimes (under the same astronomical circumstances) does not exist, which at the same place is seen by one observer and not by another, which sometimes remains apparently constant for at least several seconds of time, and sometimes varies from instant to instant. It is probable that there is irradiation of a similar kind when the wire of a meridional instrument is placed on the moon's limb; but critical observations are yet wanting."

Results of a Comparison of the Lunar Tables of Burckhardt and Hansen, with recent Meridional and Extra-Meridional Observations of the Moon, made at the Royal Observatory, Greenwich; with accompanying Remarks by the Astronomer Royal.

"In the last autumn a correspondence took place between Mr. Hind, Superintendent of the *Nautical Almanac*, and myself, on the subject of comparing Professor Hansen's new lunar tables with the observations of the moon made at the Greenwich Observatory. Mr. Hind entered most warmly into the matter; and, with a zeal for which astronomers cannot be too grateful, at once undertook to superintend, in the *Nautical Almanac* Office, the laborious operations for computing the moon's place from Hansen's tables, provided the funds for supporting the necessary expenses should be supplied by the Government. The Lords Commissioners of the Admiralty without hesitation granted the necessary sums, and the calculations were soon commenced on the scheme which had been arranged.

"In explanation of the plan of comparison, it is to be remarked that the Greenwich observations of the moon consist of two series, one made with the meridional transit-circle, and the other made with the extra-meridional altazimuth. The meridional observations are, nearly without exception, confined to those parts of the moon's orbit in which her transit takes place between 6^h and 18^h mean solar time. The extra-meridional

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observations extend over almost all parts of the orbit, but the mean solar hour of the actual observation with the altazimuth is usually between 6^h and 18^h, and though, from the nature of the observations (which are not made simultaneously on the two elements) it is not possible, as in the meridional results, to state *precisely* the hour and minute to which the inferred tabular errors apply, yet the hour can be *very nearly* stated, and that hour will not be very far distant from midnight.

"The Greenwich observations exhibit the apparent errors of the places of the *Nautical Almanac* (Burckhardt's) as compared with every day's observations of the moon. These apparent errors are corrected (so far as applies to the present purpose) for the faults of the *Nautical Almanac* parallax (Burckhardt's) in a table at the end of the introduction to the Greenwich observations 1856. As great pains have been taken to use a correct value also of the semi-diameter, the final results of that table may be received as exhibiting, with the utmost accuracy, the errors of Burckhardt's longitude and latitude deduced from observations made on the moon with two first-class instruments, at hours not very distant from the midnight of every specified day.

"Now, as on many days, observations were made with both instruments, but at different hours; and as one of these hours is a little indefinite, and as the errors of the lunar tables alter very little in two or three hours, there was evidently a great gain of convenience, without danger of sensible inaccuracy, in referring the errors in all cases to the midnight. And the adoption of this time very greatly facilitated the remaining calculations. For the *Nautical Almanac* contains ready calculated the longitude and latitude of the moon at every midnight, and it would be necessary therefore only to compute Hansen's places for midnight, a limitation which greatly alleviates the labour of applying the tables.

"At the present time, I have received from Mr. Hind the comparison of Burckhardt's and Hansen's places only for the year 1852. But the results of the comparison for that year are so astonishing that I deem it a duty at once to lay them before the Society.

"In the following tables, to avoid a slight confusion arising from the mixture of results with the two instruments, I exhibit separately the results obtained from the transit-circle and from the altazimuth. I use the symbol B – O to denote the excess of Burckhardt's place (in either element) above the observed place, as taken from the appendix to the introduction to the *Greenwich Observations*, 1856. And I use the symbol H – B to denote the excess of Hansen's place above Burckhardt's place, as found by Mr. Hind. The sum of these, or H – O, is evidently the excess of Hansen's place above the observed place.

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For Observations with the Transit-Circle.

Day. 1852.	Longitude.			Ecliptic N.P.D.		
	B—O.	H—B.	H—O.	B—O.	H—B.	H—O.
	″	″	″	″	″	″
Jan. 3	+ 7·1	− 9·9	−2·8	− 5·2	+ 5·5	+0·3
4	+ 9·8	−11·8	−2·0	− 6·4	+ 5·5	−0·9
5	+ 9·8	−13·0	−3·2	− 6·1	+ 5·8	−0·3
6	+11·9	−14·3	−2·4	− 5·1	+ 5·8	+0·7
7	+15·1	−14·7	+0·4	− 5·5	+ 5·9	+0·4
9	+14·3	−14·5	−0·2	− 6·4	+ 5·3	−1·1
11	+16·1	−16·2	−0·1	− 2·4	+ 3·7	+1·3
25	+ 1·7	+ 0·5	+2·2	− 0·8	+ 0·5	−0·3
26	− 1·3	+ 0·5	−0·8	+ 1·2	+ 2·1	+3·3
28	− 0·1	− 2·7	−2·8	− 3·7	+ 3·5	−0·2
29	+ 3·3	− 5·5	−2·2	− 6·4	+ 5·0	−1·4
30	+ 5·3	− 8·4	−3·1	− 6·6	+ 5·1	−1·5
Feb. 1	+ 7·8	−12·2	−4·4	− 8·3	+ 6·3	−2·0
2	+ 9·8	−13·2	−3·4	− 2·1	+ 6·7	+4·6
3	+ 9·9	−13·7	−3·8	− 5·4	+ 6·5	+1·1
6	+18·1	−17·6	+0·5	− 5·5	+ 4·5	−1·0
9	+13·4	−12·8	+0·6	− 1·2	0·0	−1·2
11	+10·1	−10·5	−0·4	+ 3·3	− 3·4	−0·1
25	− 1·7	− 1·0	−2·7	− 3·4	+ 2·4	−1·0
27	+ 2·4	− 6·6	−4·2	− 4·2	+ 3·1	−1·1
29	+ 5·9	−11·6	−5·7	− 6·1	+ 5·2	−0·9
March 2	+11·9	−12·6	−0·7	− 3·9	+ 6·9	+3·0
3	+ 8·3	−11·5	−3·2	− 5·8	+ 6·9	+1·1
4	+11·3	−13·5	−2·2	− 6·2	+ 6·1	−0·1
5	+13·0	−14·8	−1·8	− 3·9	+ 4·7	+0·8
6	+12·5	−15·8	−3·3	− 1·3	+ 3·1	+1·8
28	+ 4·2	−10·7	−6·5	− 5·2	+ 4·9	−0·3
30	+14·7	−13·1	+1·6	− 9·3	+ 7·7	−1·6
April 1	+ 8·3	−12·7	−4·4	− 6·3	+ 8·1	+1·8
2	+11·5	−12·3	−0·8	− 8·3	+ 7·0	−1·3
3	+11·0	−12·7	−1·7	− 4·8	+ 5·6	+0·8
4	+11·6	−12·9	−1·3	− 0·6	+ 3·8	+3·2
5	+10·8	−13·0	−2·2	+ 0·5	+ 2·1	+2·6
26	+ 4·2	−12·7	−8·5	− 7·6	+ 7·2	−0·4
27	+ 5·0	−14·2	−9·2	− 7·8	+ 8·0	+0·2

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Day. 1852.		Longitude.			Ecliptic N.P.D.		
		B—O.	H—B.	H—O.	B—O.	H—B.	H—O.
		″	″	″	″	″	″
May	1	+ 7·8	−12·0	−4·2	− 5·4	+ 5·4	0·0
	2	+ 8·6	−11·7	−3·1	− 0·6	+ 3·8	+3·2
	3	+10·7	−12·7	−2·0	− 0·0	+ 2·2	+2·2
	4	+10·6	−13·8	−3·2	− 2·2	+ 1·0	−1·2
	7	+ 6·1	− 7·3	−1·2	+ 1·7	− 1·5	+0·2
	24	+ 7·1	−14·7	−7·6	− 6·0	+ 5·4	−0·6
	31	+ 7·8	−11·0	−3·2	+ 0·8	− 1·5	−0·7
June	4	+ 7·9	− 8·8	−0·9	+ 0·5	− 3·0	−2·5
	22	+11·8	−18·9	−7·1	− 6·2	+ 2·8	−3·4
	26	+ 5·5	−12·4	−6·9	− 1·1	− 1·2	−2·3
	27	+ 4·0	−11·4	−7·4	+ 2·2	− 2·8	−0·6
	29	+ 5·2	−10·1	−4·9	+ 5·6	− 5·8	−0·2
July	1	+ 5·3	− 7·8	−2·5	+ 5·9	− 6·0	−0·1
	2	+ 6·2	− 6·7	−0·5	+ 8·3	− 5·2	+3·1
	3	+ 3·5	− 6·0	−2·5	+ 5·6	− 4·0	+1·6
	4	+ 9·0	− 5·1	+3·9	+ 2·7	− 2·1	+0·6
	6	+ 7·2	− 2·7	+4·5	− 1·2	+ 1·4	+0·2
	8	+ 6·1	− 1·6	+4·5	− 3·4	+ 3·7	+0·3
	9	+ 4·8	− 2·0	+2·8	− 5·9	+ 4·6	−1·3
	10	+ 4·5	− 2·2	+2·3	− 4·2	+ 4·7	+0·5
	23	+ 9·7	−14·1	−4·4	− 2·8	+ 1·7	−1·1
	27	+ 8·9	−10·4	−1·5	+ 3·4	− 4·6	−1·2
	30	+ 5·6	−10·1	−4·5	+ 5·3	− 5·9	−0·6
	31	+ 9·9	−10·3	−0·4	+ 6·0	− 4·6	+1·4
Aug.	2	+11·7	− 8·2	+3·5	+ 0·2	− 1·2	−1·0
	3	+ 7·9	− 4·7	+3·2	+ 1·0	+ 0·5	+1·5
	4	+ 8·1	− 1·2	+6·9	− 0·1	+ 1·7	+1·6
	7	+ 8·6	0·0	+8·6	− 8·3	+ 3·8	−4·5
	9	+ 3·5	− 2·2	+1·3	− 5·4	+ 5·1	−0·3
	22	+ 5·1	− 9·0	−3·9	− 2·9	+ 1·2	−1·7
	26	+11·1	− 8·8	+2·3	+ 3·7	− 3·6	+0·1
	28	+13·9	−13·8	+0·1	+ 4·2	− 2·9	+1·3
	29	+13·8	−15·7	−1·9	+ 2·7	− 1·6	+1·1
	30	+18·1	−15·6	+2·5	+ 0·7	− 0·1	+0·6
	31	+15·0	−12·6	+2·4	− 0·8	+ 0·9	+0·1
Sept.	1	+10·9	− 7·8	+3·1	0·0	+ 1·7	+1·7
	2	+ 7·3	− 3·3	+4·0	− 1·2	+ 2·2	+1·0

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Day. 1852.	Longitude.			Ecliptic N.P.D.		
	B — O.	H — B.	H — O.	B — O.	H — B.	H — O.
	″	″	″	″	″	″
Sept. 23	+ 4·9	− 5·0	−0·1	+ 1·7	− 3·0	−1·3
24	+ 5·2	− 6·6	−1·4	+ 0·6	− 2·1	−1·5
25	+ 8·0	− 9·0	−1·0	+ 4·1	− 1·0	+3·1
29	+18·2	−13·7	+4·5	− 2·0	+ 3·3	+1·3
Oct. 2	+ 5·4	− 3·7	+1·7	− 4·7	+ 3·9	−0·8
3	+ 7·1	− 2·7	+4·4	− 6·8	+ 4·3	−2·5
4	+ 5·6	− 4·2	+1·4	− 7·2	+ 5·3	−1·9
6	+13·5	−11·7	+1·8	−10·8	+ 8·4	−2·4
18	+10·9	−15·8	−4·9	+ 5·0	− 7·0	−2·0
19	+10·3	−11·2	−0·9	− 4·4	− 6·9	−2·5
20	+ 8·9	− 8·9	0·0	+ 3·4	− 6·1	−2·7
23	+ 7·9	− 7·0	+0·9	+ 1·9	− 1·0	+0·9
24	+ 7·6	− 6·9	+0·7	+ 0·7	+ 0·5	+1·2
25	+ 9·3	− 7·8	+1·5	− 2·1	+ 2·0	−0·1
26	+10·8	− 9·3	+1·5	− 0·7	+ 3·2	+2·5
28	+14·6	−12·0	+2·6	− 4·2	+ 4·1	−0·1
29	+13·9	−11·5	+2·4	− 3·8	+ 4·0	+0·2
31	+ 8·3	− 7·4	+0·9	− 5·6	+ 4·1	−1·5
Nov. 2	+ 5·4	− 6·3	−0·9	− 5·6	+ 5·3	−0·3
3	+ 9·3	− 9·4	−0·1	− 8·2	+ 6·0	−2·2
17	+ 4·1	−10·6	−6·5	+ 4·5	− 5·7	−1·2
18	+ 5·9	−10·0	−4·1	+ 5·2	− 4·0	+1·2
24	+ 7·9	− 6·5	+1·4	− 4·0	+ 5·0	+1·0
26	+ 9·5	− 8·6	+0·9	− 6·3	+ 4·9	−1·4
27	+10·1	− 9·3	+0·8	− 6·5	+ 4·6	−1·9
28	+ 9·7	− 9·3	+0·4	− 4·3	+ 4·3	0·0
29	+ 8·2	− 7·7	+0·5	− 3·0	+ 3·9	+0·9
30	+ 5·6	− 6·4	−0·8	− 4·1	+ 3·8	−0·3
Dec. 2	+ 8·9	− 7·4	+1·5	− 3·8	+ 4·3	+0·5
15	+10·2	− 7·6	+2·6	+ 2·9	+ 4·4	+7·3
17	+ 7·1	− 6·6	+0·5	+ 0·5	+ 0·2	+0·7
18	+ 6·4	− 7·7	−1·3	− 0·4	+ 2·2	+1·8
20	+ 6·3	− 9·6	−3·3	− 6·4	+ 5·9	−0·5
21	+10·4	− 9·4	+1·0	− 6·4	+ 6·6	+0·2
27	+ 7·7	− 8·5	−0·8	− 6·4	+ 5·6	−0·8
Sum of Squares	9467·1	...	1222·3	2402·0	...	321·2

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For Observations with the Altazimuth.

Day. 1852.		Longitude.			Ecliptic N.P.D.		
		B—O.	H—B.	H—O.	B—O.	H—B.	H—O.
		″	″	″	″	″	″
Jan.	1	− 3·6	− 7·3	−10·9	− 9·2	+ 4·7	− 4·5
	2	+ 6·3	− 8·5	− 2·2	− 4·8	+ 5·1	+ 0·3
	3	+10·8	− 9·9	+ 0·9	− 7·4	+ 5·5	− 1·9
	4	+ 9·1	−11·8	− 2·7	− 1·3	+ 5·5	+ 4·2
	5	+13·2	−13·0	+ 0·2	− 4·3	+ 5·8	+ 1·5
	6	+14·1	−14·3	− 0·2	− 3·9	+ 5·8	+ 1·9
	7	+11·3	−14·7	− 3·4	− 6·1	+ 5·9	− 0·2
	8	+16·3	−14·8	+ 1·5	− 2·6	+ 5·5	+ 2·9
	9	+12·0	−14·5	− 2·5	− 7·6	+ 5·3	− 2·3
	10	+ 9·4	−15·3	− 5·9	− 5·0	+ 4·7	− 0·3
	11	+16·9	−16·2	+ 0·7	− 3·9	+ 3·7	− 0·2
	13	+24·5	−18·3	+ 6·2	− 1·2	+ 0·7	− 0·5
	15	+13·6	−16·2	− 2·6	+ 3·1	− 3·9	− 0·8
	16	+ 7·9	−11·8	− 3·9	+ 5·7	− 6·2	− 0·5
	17	+ 0·3	− 5·6	− 5·3	+ 7·5	− 7·5	0·0
	18	+ 0·9	+ 0·3	+ 1·2	+11·5	− 8·1	+ 3·4
	23	+ 0·2	0·0	+ 0·2	+ 5·1	− 3·1	+ 2·0
	25	+ 2·5	+ 0·5	+ 3·0	+ 3·9	+ 0·5	+ 4·4
	26	+ 1·9	+ 0·5	+ 2·4	− 2·1	+ 2·1	0·0
	27	+ 0·2	− 0·6	− 0·4	− 1·2	+ 3·2	+ 2·0
	28	− 0·1	− 2·7	− 2·8	− 5·3	+ 3·5	− 1·8
	29	+ 5·4	− 5·5	− 0·1	− 5·2	+ 5·0	− 0·2
	30	+ 9·0	− 8·4	+ 0·6	− 5·5	+ 5·1	− 0·4
Feb.	1	+11·8	−12·2	− 0·4	− 9·7	+ 6·3	− 3·4
	2	+17·4	−13·2	+ 4·2	− 3·8	+ 6·7	+ 2·9
	3	+14·2	−13·7	+ 0·5	− 8·7	+ 6·5	− 2·2
	5	+17·0	−16·5	+ 0·5	− 7·4	+ 5·5	− 1·9
	6	+12·8	−17·6	− 4·8	− 8·8	+ 4·5	− 4·3
	7	+15·4	−17·1	− 1·7	− 4·0	+ 3·1	− 0·9
	8	+14·5	−15·6	− 1·1	+ 0·8	+ 1·5	+ 2·3
	9	+11·1	−12·8	− 1·7	+ 0·1	0·0	+ 0·1
	10	+ 8·7	−11·0	− 2·3	+ 1·2	− 1·5	− 0·3
	11	+ 8·7	−10·5	− 1·8	+ 4·5	− 3·4	+ 1·1
	22	− 6·8	+ 2·9	− 3·9	− 1·4	+ 0·2	− 1·2
	25	− 0·1	− 1·0	− 1·1	− 2·6	+ 2·4	− 0·2

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Day. 1852.	Longitude.			Ecliptic N.P.D.		
	B—O.	H—B.	H—O.	B—O.	H—B.	H—O.
	″	″	″	″	″	″
Feb. 26	− 0·3	− 3·6	− 3·9	− 3·9	+ 2·8	− 1·1
27	+ 8·0	− 6·6	+ 1·4	− 3·4	+ 3·1	− 0·3
28	+ 11·6	− 9·5	+ 2·1	− 2·7	+ 4·1	+ 1·4
29	+ 9·8	− 11·6	− 1·8	− 2·6	+ 5·2	+ 2·6
March 1	+ 8·1	− 12·8	− 4·7	− 8·7	+ 6·3	− 2·4
2	+ 9·3	− 12·6	− 3·3	− 8·7	+ 6·9	− 1·8
3	+ 8·3	− 11·5	− 3·2	− 8·6	+ 6·9	− 1·7
4	+ 10·1	− 13·5	− 3·4	− 9·5	+ 6·1	− 3·4
5	+ 13·6	− 14·8	− 1·2	− 8·3	+ 4·7	− 3·6
6	+ 12·9	− 15·8	− 2·9	− 7·9	+ 3·1	− 4·8
7	+ 11·0	− 14·3	− 3·3	− 6·1	+ 1·2	− 4·9
14	0·0	+ 5·0	+ 5·0	+ 5·8	− 7·1	− 1·5
22	− 7·3	+ 4·0	− 3·3	+ 0·6	+ 1·6	+ 2·2
23	+ 0·7	+ 0·4	+ 1·1	+ 2·1	+ 2·0	+ 4·1
25	+ 6·6	− 4·5	+ 2·1	− 0·7	+ 2·5	− 1·8
26	+ 4·9	− 7·2	− 2·3	− 1·3	+ 3·0	+ 1·7
27	+ 11·3	− 9·0	+ 2·3	− 2·3	+ 3·9	+ 1·6
28	+ 18·2	− 10·7	+ 7·5	− 6·9	+ 4·9	− 2·0
30	+ 14·5	− 13·1	+ 1·4	− 4·6	+ 7·7	+ 3·1
April 1	+ 14·9	− 12·7	+ 2·2	− 11·6	+ 8·1	− 3·5
2	+ 11·8	− 12·3	− 0·5	− 9·1	+ 7·0	− 2·1
3	+ 10·8	− 12·7	− 1·9	− 4·2	+ 5·6	+ 1·4
4	+ 8·2	− 12·9	− 4·7	− 5·7	+ 3·8	− 1·9
5	+ 8·6	− 13·0	− 4·4	− 4·8	+ 2·1	− 2·7
8	+ 4·2	− 4·4	− 0·2	− 0·8	− 1·9	− 2·7
9	− 0·5	− 1·6	− 2·1	+ 4·1	− 3·4	+ 0·7
10	− 2·4	+ 0·4	− 2·0	+ 5·3	− 4·4	+ 0·9
13	− 2·4	+ 7·6	+ 5·2	+ 3·1	− 4·0	− 0·9
21	− 2·6	− 3·3	− 5·9	− 1·7	+ 2·9	+ 1·2
22	+ 11·5	− 7·6	+ 3·9	+ 2·8	+ 3·4	+ 6·2
24	+ 12·6	− 10·9	+ 1·7	− 4·0	+ 4·7	+ 0·7
25	+ 12·0	− 11·9	+ 0·1	− 6·5	+ 5·8	− 0·7
26	+ 11·8	− 12·7	− 0·9	− 11·7	+ 7·2	− 4·5
27	+ 14·9	− 14·2	+ 0·7	− 7·8	+ 8·0	+ 0·2
29	+ 6·4	− 15·1	− 8·7	− 11·7	+ 8·2	− 3·5
May 1	+ 15·7	− 12·0	+ 3·7	− 6·3	+ 5·4	− 0·9
2	+ 8·9	− 11·7	− 2·8	− 3·1	+ 3·8	+ 0·7

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Day. 1852.		Longitude.			Ecliptic N.P.D.		
		B — O.	H — B.	H — O.	B — O.	H — B.	H — O.
		″	″	″	″	″	″
May	3	+11·5	−12·7	− 1·2	+ 0·6	+ 2·2	+ 2·8
	4	+ 7·6	−13·8	− 6·2	− 0·9	+ 1·0	+ 0·1
	5	+11·9	−13·2	− 1·3	− 3·7	− 0·2	− 3·9
	10	+ 5·8	− 2·0	+ 3·8	+ 2·4	− 2·4	− 0·0
	22	+ 9·9	−13·5	− 3·6	+ 0·8	+ 4·0	+ 4·8
	29	+ 6·2	−12·9	− 6·7	+ 1·3	+ 1·5	+ 2·8
	31	+ 5·8	−11·0	− 5·2	− 0·3	− 1·5	− 1·8
June	1	+12·8	−12·0	+ 0·8	+ 0·3	− 2·6	− 2·3
	2	+ 6·1	−12·1	− 6·0	− 1·4	− 3·2	− 4·6
	4	+ 8·5	− 8·8	− 0·3	− 1·0	− 3·0	− 4·0
	10	+ 4·8	− 3·6	+ 1·2	− 9·2	+ 3·3	− 5·9
	11	+ 3·6	− 1·9	+ 1·7	− 5·9	+ 3·9	− 2·0
	19	+14·5	−16·7	− 2·2	− 4·5	+ 2·6	− 1·9
	21	+16·1	−19·1	− 3·0	− 0·7	+ 3·0	+ 2·3
	22	+13·0	−18·9	− 5·9	− 1·7	+ 2·8	+ 1·1
	23	+13·5	−18·0	− 4·5	− 0·1	+ 2·5	+ 2·4
	24	+11·1	−16·2	− 5·1	− 0·6	+ 1·7	+ 1·1
	26	+10·6	−12·4	− 1·8	+ 1·5	− 1·2	+ 0·3
	27	+ 4·0	−11·4	− 7·4	+ 1·1	− 2·8	− 1·7
	29	+ 6·5	−10·1	− 3·6	+ 4·7	− 5·8	− 1·1
	30	+11·4	− 8·8	+ 2·6	+ 9·3	− 6·2	+ 3·1
July	1	+ 6·0	− 7·8	− 1·8	+ 7·6	− 6·0	+ 1·6
	2	+ 4·9	− 6·7	− 1·8	+ 4·7	− 5·2	− 0·5
	3	+ 6·2	− 6·0	+ 0·2	+ 3·8	− 4·0	− 0·2
	4	+ 8·5	− 5·1	+ 3·4	+ 0·1	− 2·1	− 2·0
	5	+ 7·9	− 4·0	+ 3·9	− 1·9	0·0	− 1·9
	6	+ 3·9	− 2·7	+ 1·2	− 5·6	+ 1·4	− 4·2
	7	+ 0·8	− 2·0	− 1·2	− 7·2	+ 2·6	− 4·6
	8	− 0·6	− 1·6	− 2·2	− 6·0	+ 3·7	− 2·3
	9	+ 5·0	− 2·0	+ 3·0	− 9·4	+ 4·6	− 4·8
	10	+ 6·2	− 2·2	+ 4·0	− 6·3	+ 4·7	− 1·6
	20	+25·4	−27·6	− 2·2	+ 1·3	+ 3·2	+ 4·5
	21	+19·2	−23·5	− 4·3	+ 0·6	+ 2·8	+ 3·4
	22	+11·9	−18·7	− 6·8	+ 5·5	+ 2·5	+ 8·0
	23	+ 6·8	−14·1	− 7·3	+ 4·8	+ 1·7	+ 6·5
	24	+ 5·2	−11·4	− 6·2	+ 1·3	+ 0·6	+ 1·9
	27	+ 7·4	−10·4	− 3·0	+ 4·1	− 4·6	− 0·5

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Day. 1852.		Longitude.			Ecliptic N.P.D.		
		B — O.	H — B.	H — O.	B — O.	H — B.	H — O.
July	29	+12″·2	− 9″·8	+ 2″·4	+ 5″·6	− 6″·1	− 0″·5
	30	+11·3	−10·1	+ 1·2	+ 3·5	− 5·9	− 2·4
	31	+ 9·9	−10·3	− 0·4	+ 6·4	− 4·6	+ 1·8
Aug.	1	+10·0	−10·0	0·0	− 2·8	− 3·0	− 5·8
	2	+11·8	− 8·2	+ 3·6	+ 0·2	− 1·2	− 1·0
	3	+ 5·9	− 4·7	+ 1·2	− 4·5	+ 0·5	− 4·0
	4	+ 3·9	− 1·2	+ 2·7	− 5·2	+ 1·7	− 3·5
	5	− 1·6	+ 0·8	− 0·8	− 6·4	+ 2·6	− 3·8
	6	+ 4·1	+ 1·0	+ 5·1	− 6·6	+ 3·1	− 3·5
	7	+ 8·9	0·0	+ 8·9	− 7·6	+ 3·8	− 3·8
	8	+ 6·3	− 1·5	+ 4·8	− 8·6	+ 4·3	− 4·3
	9	+ 0·6	− 2·2	− 1·6	− 9·4	+ 5·1	− 4·3
	10	+ 3·7	− 2·9	+ 0·8	− 7·1	+ 5·5	− 1·6
	18	+35·4	−35·4	0·0	− 5·1	+ 4·3	− 0·8
	19	+25·9	−27·8	− 1·9	− 3·3	+ 3·5	+ 0·2
	21	+ 7·9	−12·9	− 5·0	+ 0·3	+ 2·4	+ 2·7
	22	+10·4	− 9·0	+ 1·4	+ 0·1	+ 1·2	+ 1·3
	25	+ 7·0	− 7·4	− 0·4	+ 2·8	− 3·2	− 0·4
	26	+11·3	− 8·8	+ 2·5	+ 6·0	− 3·6	+ 2·4
	27	+14·3	−11·1	+ 3·2	+ 3·1	− 3·3	− 0·2
	28	+17·6	−13·8	+ 3·8	+ 3·9	− 2·9	+ 1·0
	29	+13·7	−15·7	− 2·0	− 0·4	− 1·6	− 2·0
	30	+16·1	−15·6	+ 0·5	− 3·4	− 0·1	− 3·5
	31	+ 8·2	−12·6	− 4·4	− 4·9	+ 0·9	− 4·0
Sept.	1	+10·3	− 7·8	+ 2·5	− 2·7	+ 1·7	− 1·0
	2	+ 4·3	− 3·3	+ 1·0	− 4·6	+ 2·2	− 2·4
	3	+ 1·9	− 0·2	+ 1·7	− 6·2	+ 2·5	− 3·7
	4	+ 7·2	+ 0·6	+ 7·8	− 6·3	+ 2·9	− 3·4
	5	+ 5·9	− 1·0	+ 4·9	− 6·2	+ 4·0	− 2·2
	7	+ 7·0	− 6·1	+ 0·9	−10·1	+ 6·7	− 3·4
	8	+ 6·3	− 8·2	− 1·9	−12·2	+ 8·0	− 4·2
	11	+13·5	−19·8	− 6·3	−10·9	+ 9·3	− 1·6
	16	+37·0	−40·7	− 3·7	− 3·5	+ 2·1	− 1·4
	17	+33·9	−32·2	+ 1·7	− 3·3	+ 0·8	− 2·5
	18	+25·2	−22·6	+ 2·6	− 3·4	− 0·4	− 3·8
	20	+ 9·3	− 9·2	+ 0·1	+ 5·5	− 2·5	+ 3·0
	21	+ 9·5	− 6·1	+ 3·4	+ 0·7	− 3·3	− 2·6

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Day. 1852.		Longitude.			Ecliptic N.P.D.		
		B—O.	H—B.	H—O.	B—O.	H—B.	H—O.
Sept.	22	+ 7″·8	− 4″·9	+ 2″·9	+ 1″·9	− 3″·4	− 1″·5
	23	+ 6·4	− 5·0	+ 1·4	+ 7·5	− 3·0	+ 4·5
	24	+ 8·6	− 6·6	+ 2·0	+ 2·4	− 2·1	+ 0·3
	25	+ 12·5	− 9·0	+ 3·5	+ 1·8	− 1·0	+ 0·8
	26	+ 13·2	− 12·1	+ 1·1	+ 1·2	+ 0·4	+ 1·6
	28	+ 15·0	− 15·2	− 0·2	− 6·2	+ 2·7	− 3·5
	29	+ 13·1	− 13·7	− 0·6	− 4·9	+ 3·3	− 1·6
	30	+ 10·3	− 10·6	− 0·3	− 7·9	+ 3·5	− 4·4
Oct.	2	+ 1·0	− 3·7	− 2·7	− 9·6	+ 3·9	− 5·7
	3	+ 2·1	− 2·7	− 0·6	− 8·5	+ 4·3	− 4·2
	4	+ 9·7	− 4·2	+ 5·5	− 8·4	+ 5·3	− 3·1
	5	+ 8·6	− 7·1	+ 1·5	− 8·1	+ 6·7	− 1·4
	6	+ 4·3	− 11·7	− 7·4	− 11·4	+ 8·4	− 3·0
	8	+ 11·1	− 18·2	− 7·1	− 10·0	+ 9·5	− 0·5
	11	+ 26·2	− 26·8	− 0·6	− 14·5	+ 5·3	− 9·2
	15	+ 41·1	− 37·9	+ 3·2	− 7·4	− 3·7	− 11·1
	17	+ 23·3	− 22·6	+ 0·7	+ 4·6	− 6·3	− 1·7
	18	+ 7·6	− 15·8	− 8·2	+ 4·8	− 7·0	− 2·2
	19	+ 7·2	− 11·2	− 4·0	+ 4·5	− 6·9	− 2·4
	20	+ 6·3	− 8·9	− 2·6	+ 5·3	− 6·1	− 0·8
	21	− 7·9	− 7·7	+ 0·2	+ 5·1	− 4·7	+ 0·4
	22	+ 8·1	− 7·1	+ 1·0	+ 0·9	− 2·9	− 2·0
	23	+ 8·2	− 7·0	+ 1·2	− 0·1	− 1·0	− 1·1
	24	+ 6·5	− 6·9	− 0·4	− 1·9	+ 0·5	− 1·4
	25	+ 11·1	− 7·8	+ 3·3	− 0·6	+ 2·0	+ 1·4
	26	+ 10·9	− 9·3	+ 1·6	− 6·1	+ 3·2	− 2·9
	27	+ 11·4	− 11·0	+ 0·4	− 6·2	+ 3·9	− 2·3
	28	+ 17·3	− 12·0	+ 5·3	− 3·5	+ 4·1	+ 0·6
	29	+ 13·3	− 11·5	+ 1·8	− 3·7	+ 4·0	+ 0·3
	30	+ 13·8	− 9·7	+ 4·1	− 0·7	+ 3·9	+ 3·2
	31	+ 10·6	− 7·4	+ 3·2	− 7·0	+ 4·1	− 2·9
Nov.	2	+ 10·2	− 6·3	+ 3·9	− 11·1	+ 5·3	− 5·8
	3	+ 2·6	− 9·4	− 6·8	− 10·4	+ 6·0	− 4·4
	5	+ 15·8	− 17·8	− 2·0	− 13·0	+ 6·8	− 6·2
	7	+ 16·3	− 18·7	− 2·4	− 11·3	+ 4·4	− 6·9
	16	+ 12·0	− 12·5	− 0·5	+ 9·0	+ 7·4	+ 16·4
	17	+ 8·2	− 10·6	− 2·4	+ 7·7	− 5·7	+ 2·0

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Day. 1852.	Longitude.			Ecliptic N.P.D.		
	B − O.	H − B.	H − O.	B − O.	H − B.	H − O,
	″	″	″	″	″	″
Nov. 18	+ 7·5	−10·0	− 2·5	+ 3·5	− 4·0	− 0·5
19	+ 4·7	− 9·8	− 5·1	+ 2·2	− 1·7	+ 0·5
20	+14·3	− 9·7	+ 4·6	+ 0·2	+ 0·5	+ 0·7
24	+ 7·1	− 6·5	+ 0·6	− 6·5	+ 5·0	− 1·5
26	+11·2	− 8·6	+ 2·6	− 7·5	+ 4·9	− 2·6
27	+12·0	− 9·3	+ 2·7	− 6·3	+ 4·6	− 1·7
28	+10·6	− 9·3	+ 1·3	− 6·1	+ 4·3	− 1·8
29	+ 2·5	− 7·7	− 5·2	− 3·2	+ 3·9	+ 0·7
30	− 4·5	− 6·4	−10·9	− 5·1	+ 3·8	− 1·3
Dec. 1	+12·7	− 5·8	+ 6·9	− 2·0	+ 3·8	+ 1·8
2	+ 9·8	− 7·4	+ 2·4	− 4·6	+ 4·3	− 0·3
3	+10·5	−10·7	− 0·2	− 6·0	+ 4·1	− 1·9
15	+10·7	− 7·6	+ 3·1	+ 6·6	− 4·4	+ 2·2
17	+10·6	− 6·6	+ 4·0	+ 1·9	+ 0·2	+ 2·1
18	+ 5·7	− 7·7	− 2·0	− 3·5	+ 2·2	− 1·3
19	+ 4·8	− 8·7	− 3·9	− 2·8	+ 4·1	+ 1·3
20	+11·3	− 9·6	+ 1·7	− 5·7	+ 5·9	+ 0·2
21	+16·2	− 9·4	+ 6·8	− 3·5	+ 6·6	+ 3·1
22	+ 3·2	− 7·8	− 4·6	− 4·0	+ 7·3	+ 3·3
24	+ 6·6	− 5·9	+ 0·7	− 9·2	+ 7·1	− 2·1
25	+ 5·6	− 6·5	− 0·9	− 8·2	+ 6·5	− 1·7
26	+ 7·7	− 7·7	0·0	− 5·6	+ 6·2	+ 0·6
27	+10·1	− 8·5	+ 1·6	− 8·3	+ 5·6	− 2·7
Sum of Squares	28331·4	...	2647·0	7024·0	...	1994·4

"Thus it appears that, in the meridional observations, the sum of squares of residual errors in longitude is reduced by Hansen's tables to nearly $\frac{1}{8}$ of the sum of squares for Burckhardt's tables, and that for latitude is reduced to nearly $\frac{1}{8}$ part. And for the extra-meridional observations, the sum of squares of residual errors in longitude is reduced to nearly $\frac{1}{11}$ part; and that for latitude is reduced to nearly $\frac{1}{4}$ part. (All these denominators are a trifle too large.) Probably in no recorded instance has practical science ever advanced so far in accuracy by a single stride.

"It must, however, be borne in mind that no similar comparison has been made either of Damoiseau's tables or of tables formed from Plana's theory, adapted to corrected values of the elliptic constants, and that it is not improbable that they might

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be found to occupy a very high place as regards accuracy. The comparisons in the *Greenwich Lunar Reductions* of Plana's theory, based on Damoiseau's and Plana's elliptic constants, with observations, show that it is greatly superior to Burckhardt's.

"Besides the conclusion as to the general accuracy of Hansen's tables, two or three other conclusions will, perhaps, properly follow from this *exposé.*

"1. The policy of the establishment and vigorous employment of the altazimuth at the Royal Observatory is well supported, I conceive, by these results. In almost all cases, the largest errors of Burckhardt's places are obtained in these parts of the moon's orbit which could not be touched by the meridional instrument, and they became the crucial points for any new theory. These errors are faithfully corrected by Hansen's tables.

"2. This comparison generally furnishes a remarkable proof, if any were wanted, of the enormous value of the system of keeping up the reduction of observations to the greatest accuracy that is permitted by existing elements.

"3. So long as observations are confined to the meridional half of the moon's orbit, the variation and the parallactic equation are always combined in the same way; but in that part which is touched only by the altazimuth, they are combined in the opposite way. The equally effective correction in both parts of the orbit exhibited by Hansen's tables proves (among other things) that his parallactic equation must be very correct, and therefore that his assumption as to the sun's distance must be nearly accurate.

"It was generally understood between Mr. Hind and myself that the comparison of tables should extend from the introduction of the altazimuth in 1847 to the latest convenient year. I need not say that I wait with intense anxiety the results of the comparison for other years.

"*Royal Observatory, Greenwich, April* 29, 1859."

On the Cause of Irregularity in the Rate of a Chronometer.
By A. Wackerbarth, Esq.

"A cause of faulty performance in a chronometer has lately been made evident to me, which it had never previously occurred to me to think of; and, as it is possible it may have escaped the observation of others also, I think it may perhaps be worth while to trouble the Society with a notice of it. Some years ago I purchased a gold pocket chronometer; it had been originally made by the elder Frodsham, and was put in order for me by the present Mr. Frodsham, who, however,